

CLAIMS

What is claimed is:

1. An expansion card for adding to a computer system a Universal Serial Bus (USB) port, comprising:
 - an Accelerated Graphics Port (AGP) card connector configured to enable the expansion card to be inserted into an AGP expansion slot of the computer system; and
 - at least one USB port each adapted to mate with a USB-compatible peripheral device, wherein a USB data signal received at the AGP connector is routed to the USB port.
2. The expansion card of claim 1, wherein one or more of the at least one USB port is a USB-Plus-Power port comprising a USB receptacle at which a USB data signal and a USB power signal are presented, and a power receptacle at which a power signal is presented to a mated USB-compatible peripheral device.
3. The expansion card of claim 1, wherein the expansion card further comprises:
 - a USB connector, matable with a corresponding USB connector of the computer system, at which at least one additional USB data signal and at least one USB power signal generated by the computer system are received,
 - wherein each of the additional USB data signal and USB power signal is routed to one or more of the at least one USB port.
4. The expansion card of claim 2, wherein the expansion card further comprises:
 - a power connector, matable with a corresponding power connector of the computer system, through which the power signal is received,
 - wherein the power signal is routed to at least one of the one or more USB-Plus-Power ports.
5. The expansion card of claim 4, wherein the additional power signal is a 12VDC power signal.

6. The expansion card of claim 1, wherein the expansion card further comprises:
at least one circuit each associated with one of the at least one USB port, wherein each circuit performs signal conditioning operations on at least one signal provided at its associated USB port.
7. The expansion card of claim 5, wherein the expansion card further comprises:
a circuit configured to convert the 12VDC power signal to a 24VDC power signal, wherein the 24VDC power signal is routed to one or more of the at least one USB-Plus-Power ports.
8. The expansion card of claim 1, wherein the USB power signals are routed to all USB-Plus-Power ports.
9. The expansion card of claim 4, wherein the voltage doubling circuit comprises:
a diode having an anode and a cathode;
an inductor connected in series between the diode anode and the power signal received from the power connector;
a FET having a drain and source respectively connected to the diode anode and ground; and
a switching regulator having an input at which the power signal is received, and a switched output connected to a gate of the FET at which a FET drive signal is produced to cyclically alternate the polarity across the inductor.
10. The expansion card of claim 9, wherein the voltage doubling circuit further comprises:
a feedback circuit connecting the diode cathode to a feedback input of the switching regulator, wherein the switching regulator determines a period of the FET drive signal based on a voltage received at the feedback input.

11. An expansion card comprising:

a plurality of connectors through which USB data, USB power and power signals are received, wherein each connector is matable with a corresponding connector of the computer system;

a plurality of Universal Serial Bus (USB) ports adapted to mate with a USB-compatible device; and

circuitry for routing the USB data, USB power and power signals from the plurality of connectors to the USB ports,

wherein one of the plurality of connectors is an Accelerated Graphics Port (AGP) card connector configured to enable the expansion card to be inserted into an AGP expansion slot of the computer system.

12. The expansion card of claim 11, wherein at least one of the plurality of USB ports is a USB-Plus-Power port comprising a USB receptacle at which USB data and USB power signals are presented, and a power receptacle at which a power signal is presented.

13. The expansion card of claim 11, wherein the plurality of connectors further comprises:

a USB connector, matable with a corresponding USB connector of the computer system, at which at least one USB data signal and at least one USB power signal are received.

14. The expansion card of claim 12, wherein the plurality of connectors further comprises:

a power connector, matable with a corresponding power connector of the computer system, through which a power signal is received.

15. The expansion card of claim 11, wherein the additional power signal is a 12VDC power signal.

16. The expansion card of claim 11, wherein the expansion card further comprises:

a signal conditioning circuit constructed and arranged to perform signal conditioning operations on at least one signal to be provided to at least one of the plurality of USB ports.

17. The expansion card of claim 12, wherein the power signal presented at the power receptacle of at least one of the USB-Plus-Power ports is a 12VDC power signal, and wherein the expansion card further comprises:

a circuit configured to convert the 12VDC power signal to a 24VDC power signal, wherein the 24VDC power signal is routed to one or more of the at least one USB-Plus-Power ports.

18. The expansion card of claim 17, wherein the circuit comprises:

a diode having an anode and a cathode;
an inductor connected in series between the diode anode and the power signal received from the power connector;
a FET having a drain and source respectively connected to the diode anode and ground; and
a switching regulator having an input at which the power signal is received, and a switched output connected to a gate of the FET at which a FET drive signal is produced to cyclically alternate the polarity across the inductor.

19. The expansion card of claim 18, wherein the circuit further comprises:

a feedback circuit connecting the diode cathode to a feedback input of the switching regulator, wherein the switching regulator determines a period of the FET drive signal based on a voltage received at the feedback input.

20. An expansion card comprising:

a plurality of connectors for receiving USB data, USB power and additional power signals, comprising an Accelerated Graphics Port (AGP) card connector configured to enable the expansion card to be inserted into an AGP expansion slot of the computer system;
at least one Universal Serial Bus (USB)-Plus-Power port each adapted to mate with a USB-compatible device; and
means for routing the USB data, USB power and additional power signals received at the plurality of connectors to the USB-Plus-Power port.

21. The expansion card of claim 20, wherein one or more of the at least one USB-Plus-Power port comprises a USB receptacle at which a USB data signal and a USB power signal are presented, and a power receptacle at which a power signal is presented.
22. The expansion card of claim 20, wherein the expansion card further comprises:
 - a USB connector, matable with a corresponding USB connector of the computer system, at which at least one additional USB data signal and at least one USB power signal generated by the computer system are received,
 - wherein each of the additional USB data signal and USB power signal is routed to one or more of the at least one USB port.
23. The expansion card of claim 22, wherein the expansion card further comprises:
 - a power connector, matable with a corresponding power connector of the computer system, through which an additional power signal is received,
 - wherein the additional power signal is routed to at least one of the one or more USB-Plus-Power ports.
24. The expansion card of claim 23, wherein the additional power signal is a 12VDC power signal.
25. The expansion card of claim 20, wherein the expansion card further comprises:
 - at least one circuit each associated with one of the at least one USB-Plus-Power port, wherein each circuit performs signal conditioning operations on signals to be provided at its associated USB-Plus-Power port.
26. The expansion card of claim 24, wherein the expansion card further comprises:
 - a circuit configured to convert the 12VDC power signal to a 24VDC power signal, wherein the 24VDC power signal is routed to one or more of the at least one USB-Plus-Power ports.